In the claims:

1. (Previously presented) A method of making nanoscale catalyst patterns for an ion exchange membrane, comprising:

providing a mold having a top surface;

establishing at least one nanoscale masking element on at least a portion of the top surface;

etching exposed portions of the mold to form at least one nanoscale protrusion therein;

pressing the at least one nanoscale protrusion into a top surface of the membrane to form at least one nanoscale recess therein the at least one recess having a bottom and side walls, wherein the side walls extend from the top surface of the membrane to the bottom of the at least one recess;

depositing a layer of catalytic material on the top surface of the membrane and the bottom of the at least one recess such that the side walls remain substantially free of catalytic material; and

chemically bonding, via laser heat application, oxidation or reduction, the layer of catalytic material to the top surface of the membrane and the bottom of the at least one recess.

2. (Previously presented) The method of claim 1 wherein the membrane comprises a polymer.

3. (Previously presented) The method of claim 1 wherein the membrane is an ion conductive membrane.

4. (Previously presented) The method of claim 1 wherein the membrane is a polymer electrolyte membrane.

5. (Previously presented) The method of claim 1 wherein the membrane comprises a perfluorosulfonic acid polymer electrolyte.

6. (Previously presented) The method of claim 1 wherein the mold comprises a substrate and a molding layer including an array of nanoscale protrusions formed therein, each of the nanoscale protrusions having nanoscale dimensions.

7. (Previously presented) The method of claim 1 wherein the at least one nanoscale protrusion has a lateral dimension ranging from about 1 nm to about 100 nm.

8. (Previously presented) The method of claim 1 wherein the at least one nanoscale protrusion has a height ranging from 1 nm to about 100 μm.

9. (Previously presented) The method of claim 1 wherein the at least one nanoscale protrusion has the shape of a pillar.

10. (Previously presented) The method of claim 1 wherein the mold includes an array of nanoscale protrusions, and wherein the nanoscale protrusions form a regular pattern.

11. (Previously presented) The method of claim 1 wherein the at least one nanoscale recess has the obverse shape of the at least one nanoscale protrusion.

12. (Previously presented) The method of claim 1 wherein the bottom of the at least one nanoscale recess is parallel to the top surface of the membrane.

13. (Previously presented) The method of claim 1 wherein the side walls of the at least one recess are perpendicular to the bottom of the at least one recess and the top surface of the membrane.

14. (Canceled)

15. (Canceled)

16. (Previously presented) The method of claim 1 wherein the catalytic material is also an electrode.

17. (Previously presented) The method of claim 1 wherein the catalytic material comprises a metal.

18. (Previously presented) The method of claim 17 wherein the metal is platinum.

19 – 33. (Canceled)

34. (Previously presented) A method of making nanoscale catalyst patterns for an ion exchange membrane, comprising:

providing a malleable ion exchange membrane having a top surface;

providing a mold having at least one nanoscale protrusion;

imprinting the at least one nanoscale protrusion into the membrane to form at least one nanoscale recess in the membrane, the at least one recess having a bottom and side walls, wherein the side walls extend from the top surface of the membrane to the bottom of the at least one recess;

depositing a layer of catalytic material on the top surface of the membrane and the bottom of the at least one recess such that the side walls remain substantially free of catalytic material; and

chemically bonding, via laser heat application, oxidation or reduction, the layer of catalytic material to the top surface of the membrane and the bottom of the at least one recess.

35. (Previously presented) The method of claim 34 wherein the membrane comprises a polymer.

36. (Previously presented) The method of claim 34 wherein the membrane is an ion conductive membrane or a polymer electrolyte membrane.

37. (Previously presented) The method of claim 34 wherein the membrane comprises a perfluorosulfonic acid polymer electrolyte.

38. (Previously presented) The method of claim 34 wherein the mold comprises a substrate and a molding layer including an array of protruding features having nanoscale dimensions.

39. (Previously presented) The method of claim 34 wherein the at least one nanoscale protrusion includes a lateral dimension ranging from about 1 nm to about 100 μm, and a height ranging from about 1 nm to about 100 μm.

40. (Previously presented) The method of claim 34 wherein the at least one nanoscale protrusion has the shape of a pillar.

41. (Previously presented) The method of claim 34 wherein the mold includes an array of nanoscale protrusions that form a regular pattern.

42. (Previously presented) The method of claim 34 wherein the at least one nanoscale recess has the obverse shape of the at least one nanoscale protrusion.

43. (Previously presented) The method of claim 34 wherein the bottom of the at least one recess is parallel to the top surface of the membrane, and the side walls of the at least one recess are perpendicular to the bottom of the at least one recess and the top surface of the membrane.

44. (Previously presented) The method of claim 34 wherein the side walls of the at least one recess have a depth ranging from about 1 nm to about 100 μm.

45. (Canceled)

46. (Previously presented) The method of claim 34 wherein the catalytic material is also an electrode.

47. (Previously presented) The method of claim 34 wherein the catalytic material comprises a metal including platinum.

48. (Previously presented) The method of claim 34 wherein the at least one recess has a lateral dimension ranging from about 1 nm to about 100 nm.

49. (Canceled)